

Fire Protection Materials

Plunging into Earth's atmosphere on return from space, the Apollo Command Module encountered friction temperatures as high as 5,000 degrees Fahrenheit on its exterior surfaces—yet the interior remained cool. The reason was the spacecraft's heat shield, coated with an "ablative" material applied to external surfaces. The material was allowed to burn and thereby dissipate heat energy; in addition, the burned material charred to form a protective coating which blocked heat penetration beyond the outer surface. The heat shield was designed and built by Avco Corporation, which subsequently—under a contract with Ames Research Center—applied the heat shield technology to the field of fire protection, specifically in development of fire-retardant paints and foams for aircraft and other applications.

Avco has also drawn upon its heat shield experience to develop a number of widely-accepted commercial fire protection materials, produced by Avco Specialty Materials Division, Lowell, Massachusetts. One such material is Chartek® 59 fireproofing, an intumescent epoxy coating specifically designed for outdoor use by industrial facilities dealing with highly flammable products—oil refineries and chemical plants, for example. The coating is applied—usually by spray gun as shown at right—to exterior structural steel, conduits, pipes and valves, offshore platforms and liquefied petroleum gas tanks, such as the one shown below. In the presence of fire, Chartek 59 fireproofing provides two types of protection: ablation, or dissipation of heat by burnoff, and "intumescence," or swelling; the coating swells to about five times its original size, forming a protective blanket of char which retards transfer of heat to the metal structure.

This prevents loss of structural strength and possible collapse which would compound the fire-fighting problem. Chartek 59 fireproofing offers a bonus: because it is non-porous, it also serves as a superior anti-corrosion coating.

The technology developed for NASA provided a foundation for several other fire protection products: Fire-Flex® intumescent tape for protective wrapping of fuel lines, tubes and cables; Thermarest® foams for thermal insulation; and Flamarest® coatings, a line of intumescent paints for a broad variety of applications.

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